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APRIL, 1962



MONTHLY
Vol. XXVII No. 1

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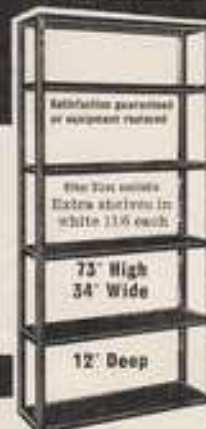
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1962

Editorial

AQUARISTS have known for some time that a fish only slightly injured by careless netting and handling is liable to develop fungus and that this can cause its death. In the past this fungus was always assumed to be of one kind, of the genus *Saprolegnia*. It is now known that although this genus is the most common parasitic one, there are many other kinds of aquatic fungi that may grow on fishes and on their eggs. These fungi appear to be widespread in all kinds of waters, and can exist in swimming spore forms (zoospores) that grow rapidly when contact is made with an injured fish into a branching structure, the mycelium, which can reach proportions visible to the naked eye, as does the kind that produces an appearance of cotton wool. However, it is necessary to distinguish between fungi that are truly parasitic on the fish and those that grow because they will develop on any dead or decaying matter of the right kind, that is those fungi called the saprophytes. The parasitic kinds are the ones most to be feared, for once they gain entry through a damaged part of a fish they can spread into its body and kill it.

In a survey made of fungus-infected fishes and eggs from hatcheries in the U.S.A., results of which were published in *The Progressive Fish-Culturist* at the beginning of this year, 13 species of fungi of the genera *Saprolegnia*, *Achlya*, *Aphanomyces*, *Pythium*, *Allomyces* and *Leptomitris* were identified. All five species of *Saprolegnia* and one species of *Achlya* were shown to be capable of infecting wounded platys by inoculation. This survey also identified some fungi found on fish eggs that had not previously been known to grow on these. More will certainly yet be discovered about the latter type of parasitism, and in particular about the special conditions and circumstances that cause eggs to become liable to attack. It may be that the reason why some aquarists find it necessary to alter the chemical condition of the water used, to ensure hatching of eggs from certain tropical fishes, is that the alterations make conditions unsuitable for the parasitic fungi present.

Contents

	Page
Editorial	1
The Unicorn Illness	2
Goldfish Gossip	3
The Upside-down Catfish	5
Shubunkins—How many Kinds?	6
Book Review	7
<i>Pristella vittata</i>	8
House-Plants in the Fish House	9
The Spawning	10
Breeding White Cloud Minnows	11
For Community and Breeding Tanks	12
<i>Nesobius anerysi</i>	14
Nymph Goldfish	15
A Thermostatic Aquarium Alarm	16
British Reptiles and Amphibians	17
Readers' Queries Answered	19
Our Readers Write	21
News from Aquarists' Societies	23

The Unicorn Blenny

by JOHN BOURSOT

OF the large assemblage of anatomically and behaviourally diversified fishes comprising the Blennioides, the sponge or unicorn blenny (*Parablennius marmoratus*) is especially deserving of mention.

Over a year ago a pair of these charming little blennies was fished out of a crowded dealer's tank, put into a small 3 pint plastic bag and handed to me as a gift. After a few wild dashes the blennies settled down and allowed themselves to be inspected. At my hotel I untied the bag and put it on the chest of drawers, where the blennies could enjoy quiet for 2 days and a night. The only time they were put under lock and key was during those insecure morning hours when invading chamber maids swoop down on corridors and bedrooms like a visitation, and with sweet abandon and a disarming smile dump all questionable liquids and their contents into the slop-pail.

The blennies quickly grew accustomed to their temporary quarters, and were soon ready for the last lap of the journey. In expectation of a barrage of piscine questions and an hour's wrangling (for lack of a piscine health certificate) at my destination with those vastly important members of that international brigade of parasites, the Customs officials, I bedded the blennies down among shoes and soiled linen in a deep zipper hand bag. The plane flight with the blennies under the seat was uneventful.

In the Custom-house pompous inspectors plunged to the attack. "What's in here?" demanded one of them, opening the bag and starting to fiddle about in the upper layers of clothing. "Dirty linen", I said, trying to look indifferent. Satisfaction shone in the man's face, the bag was chalk-marked, and in a few moments I was bowling merrily homeward in a taxi.

Settling In

To give the blennies time to recover from the stygian darkness and vibrations of the voyage after being unpacked, I left them in their plastic bag for an hour or two. This gave me time to cover the bottom of a 20 in. by 10 in. stainless-steel tank with a layer of sand just sufficient to hide the slate, to put in a few stones, including a honey-combed piece of coral rock, and fill it with clean sea water to a depth of 6 inches. An air stone frothed away at one end. There was no filter. The thermometer stood at about 80°F (27°C). The blennies and a quantity of travelling water were then transferred to a small plastic box, and floated in the aquarium until both were of the same temperature. When all was ready I gently lifted the blennies over the side into the aquarium, and threw the travelling water away. The two fish immediately made for cover, but soon emerged to explore their surroundings.

Two or three days elapsed before the fish discovered the source of their food, and then only by my touching the mouth of each with a tiny piece of shrimp on the end of a toothpick. Fine algae now cover the stones, and the water, which is crystal clear, has never needed changing. Although I siphon off the bottom and top up with fresh water only occasionally, it is no exaggeration to say that

the blennies have never given me so much as a shadow of trouble since the day I first set eyes on them.

The fact that not all blennies become well adapted to life in captivity is illustrated by two closely related species, *Hypoblennius gilberti* and *H. geminus*, both of similar habits and from the same habitat along the shores of California, are strikingly dissimilar in accepting domestication. Whereas the former is always shy and retiring, the latter quickly learns to recognise its owner, even rushing to the front of the tank upon seeing the familiar preliminaries associated with meal-time.

Blenny Forms

The universally distributed blennies or kelp fishes are a large and successful group containing a great many species of both scaled and scaleless rather elongated fishes of small to moderate size, and remarkable for their abundantly slimy covering. The tiny *Trigloporus nasus* from the sunny rock pools of the tropical western Pacific is mature at 1 inch, but *Heterostichus rostratus*, widely distributed along the western coast of North America, grows to 2 feet. Some blennies are beautifully coloured. Many are adorned with dendritic excrescences in the form of 'trees', frills and fleshy branching tufts, though these refinements of attire are not readily appreciated without the aid of a lens. A single dorsal fin, sometimes continuous with the tail, begins at the back of the head. In some species the fin is deeply cleft. The ventrals, if present at all, always show a persistent reduction in the number of rays (three in the unicorn blenny, two very long and one short), are always jugular and help the fish to move about among rocks. Some species can survive in wet seaweed when the tide is out.

Carnivorous, omnivorous, oviparous and viviparous forms occur among the blennies. Especially interesting is the ophioblennius, once placed in a different sub-family, but now known to be the post-larval stage of many species of scaleless blennies, and found swimming freely in the plankton.

Unlike the scaleless blennies (Blenniidae), our unicorn blenny is a scaled species of the family Clinidae. About 2 inches long, it appears at first glance to be remarkably unattractive, being of a uniform nondescript greyish-brown. However, a moment's study of the fish at close range reveals a rich pattern of great intricacy. Three large ocelli on the hinder part of the dorsal fin, and one near the tail at the end of the long anal fin, recall the lovely wings of the argus pheasant. A sprinkling of sky-blue specks is particularly noticeable on and around the head, which is adorned with bushy tufts of skin. The two large bright bronze eyes can move independently of each other like those of a sea horse or a chameleon. Unicorn blennies, though not particularly sociable, make good tank mates on account of their quiet and retiring habits. Their jaws are well armed with teeth.

The sexes are not readily distinguishable, though the horn-like forepart of the dorsal fin is slightly higher in the male. During mating both the male and the female

Please turn to page 4

Goldfish Gossip

by RICHARD GUPPY

SO much has been said and written about that pioneer of aquarium fishes, the goldfish, that I would ordinarily hesitate to add my bit to the pile. Over the years though, much has come to light that seems worthy of record. At this stage, I find it interesting to consider just what my views would be, on the habits of goldfish, had I been able to form my own opinions, entirely uninfluenced

by the published findings of others. Here are a few. Goldfish can't be sexed at any time, least of all by tubercles on the gill covers of the male fish. Male goldfish never drive the females. Goldfish are very largely nocturnal in habit, and never actually hibernate, even in the coldest weather, unless they are on the point of being frozen to death. Some of these unorthodox notions must have originated



Photo:

R. Guppy

Goldfish spawning in a clump of floating grass in shallow water

entirely by chance; thus I seem to have acquired a strain of fish that never develops breeding tubercles, and that is so in spite of my stock having come from two entirely unrelated sources. Some of the discrepancies are possibly due to the conditions under which my fish live, of ample space and water of a rather uniform temperature at all seasons. But in the end, I am going to have to get out on a limb, and state my opinion that other pond owners would have made the same observations, had they watched their fish more closely.

It is an undoubted fact that differences in environment will profoundly alter the habits of goldfish. My ponds can be called natural ones, since, though I dug them myself, they are just holes in the ground; no concrete or other impervious material has been added, they stay full only because of a high water table at the site. The largest is somewhat kidney shaped, about 35 feet across its longest dimension, and 14 to 18 inches deep in summer, about 6 inches deeper in winter and spring. In this pond the fish manage to stay out of sight during most of the daylight hours, though with a flashlight at night, some can nearly always be seen cruising around in the more open parts. The season of greatest activity is May and June, when there are usually some fish on the move all day; these are the months when spawning takes place. There follows immediately, in July and August, the time of greatest quietude, when it is frequently impossible to see any fish even at night. On winter nights I can nearly always spot quite a number even when the pond is frozen over.

Of late years the pond has become well enough stocked so that I can take out a few fish for sale. In the early spring I use a drag seine, but this method is too hard on plants and young fish for regular operation. So I build a *ad hoc* of cheap cheesecloth tied to stakes, and bait it with chicken mash. The fish which visit the bait are cornered and taken out with a dip net. Except in September and October, when a few fish sometimes show up in the late afternoon, all this catching has to be done at night. In the spawning season I do not molest them; they might come out in daylight then.

The smaller the pond, the more frequently the fish will be seen. Of course, there is always a tendency to populate a small pond more densely, and this accounts for a lot. The fish have more difficulty in finding food and so must spend more time foraging, though I cannot claim that this explains all the extra activity. When the stage is reached of the fish being forced to rely in large measure on artificial feeding, a completely new factor enters the picture. The fish now learn to watch for the human figure which they associate with food, and will increase their activity during the time of day that this food usually appears. Since they are nearly always fed in daylight, the most radical change, due to artificial feeding, is a reversal from nocturnal to diurnal habits.

The first spawning of goldfish that I was able to observe, was the most interesting, because of the great unbalance of the sexes. There were five females, all over 5 inches long, and one male about 3 inches long. It seems to me improbable that this little male was able in any way to influence the females in their spawning; rather the urge must have been spontaneous. I watched the little chap tearing frantically around the pond. He had great difficulty in keeping up with the much bigger females. Frequently he would lose track of his quarry, then spotting another, he would dash after her; the abandoned female kept right on with her business.

This queer situation was the result of my having tried to stock the pond by the purchase of "three pairs" of breeders at a rather fancy price. One of three died, the others were all females. The presence of one mature male was a fluke. I happened to get some extra small fish at no cost, and so they went into the pond just in the nick of time. The purchase of

these large fish was a mistake, I can see now, even though I might have hit upon a dealer whose sexing technique was reliable. Large fish do not readily adapt to a new environment, and the cost militates against the purchase of a decent number. A few minutes' work by some fish-eating predator could wipe them out. Moreover, a breeder may succumb to the temptation to keep late-colouring individuals to be sold eventually as large fish.

In later years I have observed many spawnings, in each of which a number of fish were concerned, with a fairly even balance of the sexes. In such cases it is easy to assume that the females are being driven, since there are always one or two males right with them, or a little behind. But still, if you want to look at it that way, it is just as easy to say that the males are trying to keep up with the females; there is never any evidence to show that the latter would stop dead as soon as they found themselves no longer followed.

To be concluded.

The Unicorn Blenny

continued from page 2

tremble violently side by side. Finally, assuming an inverted position, the latter will deposit her eggs on the underside of a stone or ledge. It seems that the male's role is satisfactorily accomplished merely by his shedding his milt into the surrounding water. When rested he is not averse to bigamy, and will let other females into the nest to add their eggs to those already there. But when temporarily fatigued he will repulse prospective wives even to the point of biting them if necessary. The male blenny is the perfect nurse. Assiduously guarding the nest, he does not spare himself in tending the eggs with all the devoted violence of which they may stand in need at the moment. Seizing them in his jaws he will pull them so hard that the fibres in the glutinous mass stretch like elastic. Then when he lets go they jerk the eggs back into position again. Energetic jostling, fanning, poking, pushing and other means of violently agitating the eggs are all resorted to in an effort to keep them as loose, free from sediment and well aerated as possible. The eggs fall to hatch in still water. Upon hatching the fry take their place in the plankton, but after a day assume the bottom-dwelling existence characteristic of the rest of their lives. The blenny spawns quite readily in the sea water aquarium. On one occasion my pair spawned in full view, the female laying her eggs in a shallow depression in the piece of coral rock referred to above. Unfortunately the male abandoned interest, and the eggs did not hatch.

In Nature the unicorn blenny frequently associates with *Ferrugia funicularis*, a species of sponge, even making its nest in the sponge's exhalant orifices. Since the countless tubes, tunnels and cavities of a sponge lend themselves so admirably to the protection of any creature able to work its way in, it will readily be seen that the little fish is never alone. A large sponge may harbour as many as 17,000 animals of many kinds, to say nothing of such noisy neighbours as the snapping shrimp *Squilla longicarpus*, which is a regular inhabitant of sponges.

The unicorn blenny adapts itself to a wide variety of ecological environments in its native haunts in the warm seas along the coasts of Florida. It is equally at home in the quiet sponge beds or in the waving submarine meadows of manatee and turtle grass in shallow water, or out on the reef far from land.

The unicorn blenny is a fine little fish for the marine aquarium, and will do well at a temperature of 75° to 80°F (24° to 27°C). It relishes raw shrimp, raw beef and full-grown brine shrimp. I cannot speak for all unicorns, but strange to say my pair regards the luxury of earthworm with the arrogant contempt of the most fastidious epicure.

The Upside-down Catfish

(*Synodontis nigriventris*)

by Dr. R. O. B. LIST

ONE of Nature's oddities, known to us as the upside-down catfish, created quite an amount of amused interest when it first came to the notice of aquarists. Why it had remained undiscovered for such a long time is quite unknown to me, and the first reference to it I can find is in 1950.

Before that time it must surely have been known to the various collectors, but it appears that the first imports came to Europe then. It is just a suggestion that the first importation could only have been very small, as no notice appears to have been taken of it until 1951. It is unusual for a new fish to arrive and be comparatively disregarded, but this would have appeared to have happened to this strange catfish. Stockholm took a great interest in the first imports in 1951 to Sweden, and the first recorded European attempts at breeding took place then.

Was the catfish regarded as such an oddity as to be valueless, or was it regarded as one of Nature's accidents? I have spoken with a number of foreign aquarists on this point; the consensus of opinion seemed to lean to the latter.

Nevertheless it is neither an accident nor so much of an oddity after all. I find, as with all catfish, that *Synodontis* is quite a delightful fellow, and I rank the species as being among those that appear to have a certain amount of natural intelligence.

Its original home is the reaches of the Lower Congo, and it can be classed as one of our nocturnal aquarium subjects. In daylight hours it prefers to remain undisturbed either under a leaf or in a corner on the top water surface of the aquarium. Towards dusk it commences its activities and becomes quite a lively fellow.

It will take small live food quite cheerfully, as well as dry, but seems to delight in looking for and eating algae. If you examine some of the more nocturnal fishes for a point of similarity, you will come across the fact that they all possess a large eye as well as a very light-sensitive iris. Although the fish is barbed, it does not appear to use these in the same way as the common catfishes. For the catfish exhibitor, I would bring a small point to the reader's notice, which was told me many years ago by one of the better-known P.B.A.S. judges. When judging 'cats', he makes a point of examining the barbels: are the barbels long and in good condition, or are they short and worn? The significance of this point lies in the feeding. I maintain that although the cats are generally regarded as scavengers, they also relish that little extra. When feeding your fishes, do so as you are accustomed to and, after they have had their fill, then feed with something extra purely for the cats. This method will give them good meals, and keep their barbels in good length and condition, otherwise they shorten them grovelling in the gravel for their share of the leftovers. I make a point of doing this, particularly with *Tetraodon*, and it shows good results.

I find that various writers are of the opinion that this fish's preference for the top surfaces may lie in the fact that their natural preserves are rich in insect larvae (*Culex* and *Anopheles*). They are not by any means vegetarians, and if the opportunity arises, a goodly selection of meat and vegetable foods is taken with great eagerness. When breeding,

however, the conditioning food which I find best is *Culex* larvae.

Sexing is not at all difficult. The male is always smaller and slimmer than the female, and he carries quite a quantity of irregular shaped black markings. The markings in the female are considerably larger but not so numerous. To breed these fish, it is my opinion, backed up by that of a number of other breeders, that to use fish less than at least 3½ to 4 years of age is useless. It would appear that they like to take their time before being bred, and various reports that I have in front of me give 6 to 8 years of being in captivity before they are interested in reproduction. This could be taken as a further instance of this fish's oddity, but the older aquarists will no doubt be able to recall the difficulties which faced them and caused so much thought and discussion on the breeding of catfishes in general; this new oddity is not after all so much of an oddity but seems to conform with the general pattern of catfishes.

The best breeding possibilities are given as follows: The aquarium should be filled with old water of 5°dH, planted with broad-leaved *Cryptocoryna*. An old flowerpot inverted, with a broken rim, makes a very good hiding place for the fish. The top surface should hold plenty of *Ceratopteris*, which should give a shaded effect. Temperatures should be in the range of 75° to 80°F (24° to 27°C).

Shortly before the spawning begins, you will note a change of colour in the breeding pair. The basic colour will change from light brown to blue grey and the dark markings will become more pronounced. The spawning will then begin and it is necessary to remove the breeding pair when spawning has ceased. The eggs have a very slight yellowish colour and are quite small.

The eggs commence to hatch out in 7 days in a temperature of 77°F (25°C) and the fry have the usual egg sac. The fish are born with maxillary barbels, which are easily discernible, and have an unusually large eye. The body colour is yellowish. They are, however, very slow growers in comparison with other fishes and will take nearly 3 weeks to reach a length of 10 millimetres. The mandibular barbels appear after the fourth week, and the branching of the barbels follows in a further 10 days.

Another oddity is that up to their seventh week of life, they will swim as other fishes, with the belly downwards. After the seventh week, attempts are made to swim with the back downwards. Attempts are usually successful quite quickly and they then remain in that way. They swim around in shoals until they are half-grown. After that they group themselves in threes and sixes and remain together until eventually parted.

For food, right from their first stages they take readily to brine-shrimp (*Artemia*) nauplii, and later will take practically all live foods as well as dried foods. I do, however, stress that with all catfish, efforts must be made to feed them, after having fed the rest of your community fishes. As scavengers, even they deserve much better treatment than that which we usually give them. If you require confirmation, enquire from those aquarists who continually put catfishes on the Show benches. They will endorse these words and have prize show cards to prove it!

SHUBUNKINS—How Many Kinds?

by JOHNSON H. HOOD

BREEDERS of shubunkins must have marvelled at, or must have been exasperated by, the great diversity of fish produced in each spawning. How often two promising fish are paired only for the aquarist to find, after hard work and patient waiting, the resultant young most disappointing. The experienced and successful breeder recognises the type of fish most likely to breed good youngsters and, what is just as important, the type of fish that do not. This knowledge is usually acquired the hard way, after many tribulations.

At the risk of inviting the wrath of many upon my head I hope to shed a little light upon some of the pitfalls of shubunkin breeding. I am aware that I am placing myself in an extremely vulnerable position for adverse criticism, but I would welcome comments and observations from other breeders who feel they could contribute something towards the sum total of our knowledge of the goldfish.

It is generally accepted there are three broad types of goldfish, namely, metallic, nacreous and matt. What is not generally recognised is the fact that each of these broad groups can be sub-divided many times. For instance, it is obvious that metallic fish can be divided roughly into three groups: those that change colour quickly; those that change colour slowly; those that never change colour. In my opinion nacreous fish (shubunkins) are subject to the same laws as metallic fish and can be subdivided in the same way. After studying the problem for some time I have decided it is possible to recognise five sub-divisions in the metallic and nacreous types of goldfish. It is possible that some readers may feel there are more than the five types listed below, that they have fish which develop in quite a different way. This would be most interesting to me and I would be pleased to hear about them. I also accept the fact that groups 2 and 3 could be compressed into one group, but I think there is a good case for five groups.

The sub-divisions are based upon the speed and manner of colouring, and to enable the reader to make quick comparisons, I will list the characteristics of each sub-division in both metallic and nacreous fish simultaneously. The classification can only begin from the age of 6 weeks and will continue for approximately 2 years. The metallics chosen as an illustration are fantails. In the nacreous fish, the metallics and mats of the spawning are ignored.

Group 1, Metallic.
Characteristics: Quick colouring. Any black in the body quickly disappears. No black in caudal fin. Caudal also lacks or partially lacks orange coloration. Can develop silver areas on body, or in an extreme case can be all silver.

Group 1, Nacreous.
Characteristics: Quick colouring. Any black or blue fades

out before or about a year old. Only colour likely to remain is red/orange, but this can fade, too, in certain fish. Colour usually disappears from fins also.

Group 2, Metallic.
Characteristics: Quick colouring. Black in dorsal contour and dorsal and caudal fins prominent for up to 2 years. Usually better red/orange colour than group 1. All fins fully coloured.

Group 2, Nacreous.
Characteristics: Fully coloured at 3-5 months. Except for a slight "breaking up" and strengthening of the colour will remain this colour for rest of life. Fins coloured (orange and/or black). Does not "bleach" easily.

Group 3, Metallic.
Characteristics: Slower in colouring (9-12 months). Turns very black before red/orange colour develops. Very richly coloured fish at 2-2½ years. All fins fully coloured. Black retained longer than in group 2.

Group 3, Nacreous.
Characteristics: Brief spell of bright coloration when first colours. Body becomes heavily pigmented with black. Head usually deep red/orange. Generally three colours only: red/orange, blue and black. Can be red/orange and black only. Rich black mottling often masks blue. Takes 2-2½ years to achieve full colour. All fins heavily marked. Never appears to bleach except in unusual circumstances.

Group 4, Metallic.
Characteristics: Takes 1½-2½ years to change colour. Black areas retained most or all of life. Occasionally black disappears but generally returns. Much black in fins. Black coloration rather brownish in character.

Group 4, Nacreous.
Characteristics: All dark markings have a brownish tinge. May have reddish/brown areas when very young but these soon turn brown. Returns to reddish/brown at 2-2½ years but always turns brown in old age. Any blue areas are inclined to a "slate" blue. Can have more than one shade of blue in the same fish. All fish that begin brown or reddish/brown and later are swamped by brownish black, then regain some colour at 2-3 years of age, belong to this group. The fin markings are very brown in character. This group all "bleach" very easily in light surroundings.

Group 5, Metallic.
Characteristics: Never change to red/orange. Remain bronze always.

Group 5, Nacreous.
Characteristics: Generally dirty brown with darker brown markings. Can have blue areas. Remain brown all their lives.

The discerning reader will quickly realise that I attach great importance to the red/orange and black factors in

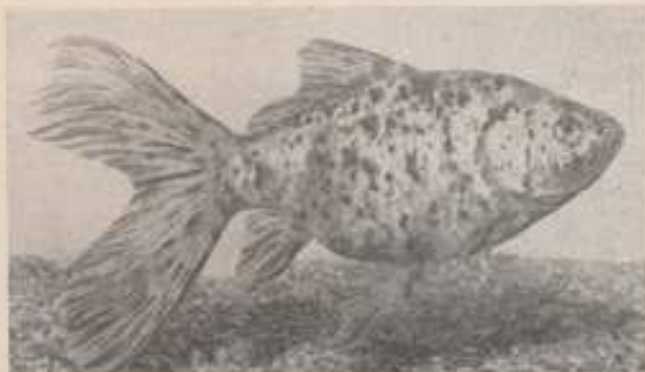


Photo:

Nacreous shubunkin

Lawrence E. Perkins

goldfish. Also these two factors are closely linked together in some way. I have noticed whenever they are dissociated from each other the results are never satisfactory, and this is particularly noticeable in shubunkins. The most unsatisfactory shubunkins are the fish which lack both the red/orange factor and the black factor. Should you have difficulty in classifying any of your fish into the groups listed, it will be because they lack the red/orange factor or the black factor or both, or because they partially lack either of these factors or partially lack both. Another complicating factor in shubunkins is the amount of nacreous scaling visible. It would be well to bear in mind that

shubunkins can be wholly, partially or slightly nacreous scaled (mother of pearl sheen) and this can completely alter the visual aspect of the fish.

I am conscious of the fact that certain living conditions can retard coloration, but I am assuming that the fish receive a reasonable amount of daylight, plus some sunshine when available.

Next month I hope to follow up with another article in which I intend to discuss the practical use of the suggested classification I have made and its application in the matter of selecting breeding fish and improving your strain of shubunkins.



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REVIEW

West African Snakes by G. S. Camdahl. Longmans, London. 74 pages, 15 coloured plates. 9s. 6d.

THIS new addition to the "West African Nature Handbooks" is strongly recommended to all those interested in snakes. The author, who has also written the Penguin book *Reptiles of West Africa*, draws on years of practical knowledge. The drawings, which are beautifully coloured and in no sense gaudy or unnatural, are really superb and a great help in problems of identification. To anyone likely to visit this part of Africa the book is a must. Yet it is also of value to the general collector, as it covers many species which are popular vivarium pets in this country. These include the African or rock python (*Python sebae*), the beautiful and all too seldom imported royal python (*Python reginae*), which was so much easier to purchase in this country a generation ago, the brown water snake (*Natrix ananjeze*), the house snakes (*Boas*

insarum and *B. virgatus*), which are also ideal vivarium species when obtainable and extremely docile, and the peculiar egg-eating snake (*Dasyatis acabra*). In addition to descriptions of over 40 species of snakes (of which 33 are illustrated in colour) there are chapters on "Snakes in Nature", "Snakes in West Africa" and "Snake bite—its Prevention and Treatment". The book is excellent value at 9s. 6d.

The Ecology and Life History of the Common Frog by R. Maxwell Savage. Sir Isaac Pitman & Sons, London. 221 pages. 25s.

THE common frog (*Rana temporaria*) must be a familiar sight to all of us, and at this time of year in countless thousands of homes throughout the land jars containing frog spawn and newly emerged tadpoles could be found. Most people, when they were young, collected spawn at some time or other and took it home to watch the tiny black dots elongate and take up the familiar tadpole shape as the weeks passed. They saw the tadpole grow and its legs develop, but how many thought of its life and chance of survival in the pond where they collected the spawn? And how few of us can say that we kept the tiny frogs after they had metamorphosed and taken to a life on land? Dr. Savage in his fascinating book fills in these gaps in our knowledge, in as far as present knowledge allows him, and points to additional problems. Nor least we learn of a man who has spent a large part of a lifetime studying one animal, and having read his book I wish

House-Plants in the Fish House

by BARRY R. JAMES

POPULAR additions to the walls of the modern home are wall-brackets containing pots with climbing or trailing plants. These versatile subjects have many other uses, however, and may be trained up trellis work or bamboo poles incorporated into room dividers or used to decorate a patio. In the vivarium they are excellent for providing cover and support for arboreal reptiles and amphibians such as tree frogs, chameleons, anolis lizards and tree snakes. In the fish house they will look charming as well as act as screens for excess of light, if trained along wires stretched just beneath the roof.

Climbing and trailing plants have a common characteristic; they all possess weak stems. Trailing plants, as their name implies, simply trail along the ground. Other plants with weak stems that are unable to grow erect, however, make their way upwards by attaching themselves to surrounding objects, and these constitute the climbing and twining plants.

Climbing is effected in various ways. In the ivy family and many other plants such as *Philodendron scandens*, special roots known as adventitious roots arise from the nodes, and attach themselves to walls or tree trunks etc. Others possess organs known as tendrils, which are really modified stems, leaves or other parts of the plant. These tendrils curve themselves around the stems of other plants, and help to support the weak stem. *Rhoicissus rhomboides* is a house-plant possessing tendrils, and for this reason the sticks provided should be thin enough for the tendrils to get a hold.

Supports for Climbers

Virginia creeper has a special gripping mechanism involving sucker-like discs, and this explains why this delightful plant can find a foothold on the smoothest wall. Still other species scramble over their neighbours by means of hooks and prickles, as does the bittersweet. As distinguished from these climbing types, the twiners simply twist around a stronger plant, the whole stem being involved in this operation. Some plants have two or more methods of climbing but they all have a common purpose—to ensure that the plant receives adequate illumination in order that the leaves can carry on the process of photosynthesis.

It follows from the preceding paragraphs that the type of support needed for house-plants of the climbing or twining types may differ if the plant is to be seen at its best. For twining plants and climbers possessing tendrils, pea sticks are the best support. These should be embedded firmly in the pot, and if possible held firm at the base with a couple of pieces of rocks jammed against the sides. To help the plant maintain and strengthen its hold, small lengths of wire or raffia should be used, but these should be tied loosely to allow for the growth of the stem. Long thin pieces of mossy bark are best for such plants as *Scindapsus* or *Philodendron scandens*, which produce adventitious roots. If this is sprayed at regular intervals the roots will soon get a firm hold. Virgin cork oak bark is ideal for the purpose and may be purchased quite cheaply from any good florist.

Climbers generally look their best if the illumination is from one direction, as this leads to a better orientation of the leaves.

Propagation of most of the climbers is simple. Cuttings root readily even at normal room temperatures. With the ivies etc. you already have a head start as the aerial roots take easily, especially if they are ligured first. Layer-



FIG. 1
Left, *Scindapsus oerfoides*: leaves are dark green and flecked with yellow. Roots attach this climber to bark, and it thrives in diffuse light. Its habitat is the Solomon Isles. Right, *Rhoicissus rhomboides*: dark green leaves with toothed edges. The plant uses tendrils for climbing and if kept pruned will form a small shrub. Cool, shady positions should be given to this South African house-plant.

ing simply consists of bending one of the stems over so that one of the nodes is in contact with the soil in an adjacent pot, and resting a piece of stone on it to keep it in position. After 2 or 3 weeks have passed sufficient rooting should have taken place to enable the new plant to be severed from the old, rather as Amazon sword plants are when produced in the aquarium.

Regular pruning should be carried out to ensure more compact growth, and weak shoots that are thrown out in winter by the ivies should be cut out, as they will lead to spindly growth and untidy appearance.

Pristella riddlei

continued from opposite page

food, which is the smallest of pond Infusoria. In the early days the fry will find *Paramecium* too large for their tiny mouths, so a mixed culture of the smaller ciliates and flagellates should be provided. To obtain this seed culture medium with finely strained pond water. If green water is also available give this as well; they will appreciate the vegetable foodstuff which it will provide.

Somewhere around the third week the fry will show a marked drop in their speed of growth; this is the next critical stage and again it is a matter of feeding. Newly hatched brine shrimps seem to provide the answer for 3 or 4 days; then introduce micro worms and, if obtainable, *Cyclops* nauplii. After the fourth or fifth week if overcrowding is avoided they should be growing well and less trouble to feed.

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It follows from the preceding paragraphs that the type of support needed for house-plants of the climbing or twining types may differ if the plant is to be seen at its best. For twining plants and climbers possessing tendrils, pea sticks are the best support. These should be embedded firmly in the pot, and if possible held firm at the base with a couple of pieces of rocks jammed against the sides. To help the plant maintain and strengthen its hold, small lengths of wire or raffia should be used, but these should be tied loosely to allow for the growth of the stem. Long thin pieces of mossy bark are best for such plants as *Scindapsus* or *Philodendron scandens*, which produce adventitious roots. If this is sprayed at regular intervals the roots will soon get a firm hold. Virgin cork oak bark is ideal for the purpose and may be purchased quite cheaply from any good florist.

Climbers generally look their best if the illumination is from one direction, as this leads to a better orientation of the leaves.

Propagation of most of the climbers is simple. Cuttings root readily even at normal room temperatures. With the ivies etc. you already have a head start as the aerial roots take easily, especially if they are ligured first. Layer-



FIG. 1
Left, *Scindapsus cuneatus*: leaves are dark green and flecked with yellow. Roots attach this climber to bark, and it thrives in diffuse light. Its habitat is the Solomon Isles. Right, *Rhoicissus rhomboides*: dark green leaves with toothed edges. The plant uses tendrils for climbing and if kept pruned will form a small shrub. Cool, shady positions should be given to this South African house-plant.

ing simply consists of bending one of the stems over so that one of the nodes is in contact with the soil in an adjacent pot, and resting a piece of stone on it to keep it in position. After 2 or 3 weeks have passed sufficient rooting should have taken place to enable the new plant to be severed from the old, rather as Amazon sword plants are when produced in the aquarium.

Regular pruning should be carried out to ensure more compact growth, and weak shoots that are thrown out in winter by the ivies should be cut out, as they will lead to spindly growth and untidy appearance.

Pristella riddlei

continued from opposite page

food, which is the smallest of pond Infusoria. In the early days the fry will find *Paramecium* too large for their tiny mouths, so a mixed culture of the smaller ciliates and flagellates should be provided. To obtain this seed culture medium with finely strained pond water. If green water is also available give this as well; they will appreciate the vegetable foodstuff which it will provide.

Somewhere around the third week the fry will show a marked drop in their speed of growth; this is the next critical stage and again it is a matter of feeding. Newly hatched brine shrimps seem to provide the answer for 3 or 4 days; then introduce micro worms and, if obtainable, *Cyclops* nauplii. After the fourth or fifth week if overcrowding is avoided they should be growing well and less trouble to feed.

The Spawning

by A. BOARDER

HAVING prepared the fish for spawning the aquarist must make up his mind whether to breed in an open pond or to do so in tanks in a more controlled manner. To breed in tanks is perhaps the easier method as it enables the aquarist to use methods for encouraging the actual spawnings, which would be very difficult if not impossible in the pond. For instance, when the breeders are kept in tanks it is fairly easy to keep the sexes separate, and so by bringing them together they will be encouraged to spawn when and where the aquarist needs them to. In the pond the spawning is usually left very much to chance, and one has often to wait for suitable weather conditions before any spawnings will take place.

I will deal with the controlled breeding first. Where it is possible the males should have been in separate tanks for most of the winter. If a fish house is available, or warmed tanks, spawnings can be started fairly early in the year. This will enable the breeder to get the fry to a good size before the following winter.

Hornwort for the Eggs

As most fish prefer shallow water for the act of spawning there is no need to fill the tanks, but make sure that there are plenty of water plants in the spawning tank. Fine-leaved plants are the best, not that the fish care much what kind of plant they lay their eggs on, but if a fairly dense mass of fine-leaved plants is available then many eggs will be saved that might otherwise have been eaten. The plant popularly known as hornwort (*Ceratophyllum demersum*) is a very good one as it has no proper roots and so lends itself well for use in the spawning tank, which need have no base compost. The plants should be well washed in some potassium permanganate solution before going into the tank (a small heap of the crystals about three-eighths of an inch across to a gallon of water will do). If the plants are collected from a natural pond or stream great care must be taken to ensure that no pests are present when the plants are put into the tank. Goldfish like to spawn on plants that are either floating on the surface or are very near to it.

When spawning is needed the males can be placed in the spawning tank overnight and the females can be introduced in the early morning. It is a good plan to have the males in the tank a couple of days earlier than this so that they have a chance of eating any pests that may be present on the plants. No artificial food should be given during this period. Once spawning starts it can be very violent, and many beginners immediately remove the females as they believe that they are being killed. The males chase the females and nudge them with their noses, pushing them around and into the thickest part of the water plants. The fish may lie side by side for some time and then suddenly both become very agitated and splash violently over the top of the plants. At the same time the female will lay many eggs and the male expels the milt that will fertilise them. The eggs are very small when first laid but quickly swell up to the size of an average pin's head. They are adhesive and so stick to the leaves of the plants. This performance will be repeated at intervals for some hours. Goldfish usually spawn during the morn-

ings but have been known to continue to do so well into the afternoon.

When the chasing stops the fish should be removed from the tank, so that there will be little fear of many of the eggs being eaten. Whilst the excitement of the chase is on the fish do not appear to eat the eggs, but once spawning has finished it is probable that their attentions will be directed to a good feed. When spawning is done in an open pond one can, of course, remove bunches of plants with eggs attached to a separate hatching tank, but there is little need for this provided that too many fish have not been allowed to spawn at a time. There is no need at all to have more males than females when using this controlled method. A simple pairing will enable the aquarist to be sure of the parentage of the fry and so make it easier to keep a track of pedigrees. It used to be recommended that more males than females should be used to ensure that a vigorous spawning took place and that most of the eggs were fertilised. There is little to fear on this score as there are enough sperm in the milt of one male to fertilise all the eggs laid by a hundred females.

Once spawning has ceased and the fish have been removed it is a good plan to change most of the water, about half an hour after spawning. This is because there may be many male sperm in the water that have not been able to find an egg to enter. They soon die and if in large concentrations can upset the balance of the water and turn it foul. Under these conditions many of the eggs will become mildewed and die.

The temperature of the water need not be too high for the spawnings. A lot will depend on the type of goldfish being bred. For shubunkins and fantails a temperature of 65°F (18°C) is quite enough, but if veiltails and orandas have been kept at a similar temperature throughout the winter then the tank can be raised to 70°F (21°C). Once the eggs have been laid a temperature of 70°F (21°C) is very good to ensure a fairly quick hatch. Three and a half to 4 days will bring about hatching in such a temperature. Do not try to force too quick a hatch with a higher temperature as this does not always bring forth well-shaped fry.

The idea behind the rather rapid hatch is to ensure that as few eggs as possible are likely to be eaten or spoiled by pests or diseases. Once an egg dies a fuzzy growth covers it. Infertile eggs also take on this mildew. No snails should be allowed in the spawning tank at all but it is possible that a number of small maggot-like creatures may be present on the plants and they can eat into and spoil the eggs. These are the larvae of a tiny fly that lays its eggs on water plants. There is little one can do at this stage except get the fry out of the eggs fairly quickly at the temperature suggested. If many eggs are in the tank it is a good plan to provide some aeration, as it is essential that the water is well charged with oxygen all the time the fry are growing in the eggs. Draw a sheet of paper over the surface of the water each day to remove any dust or film.

The next article in this series will deal with breeding in the open pond.

THE AQUARIST

Breeding WHITE CLOUD MINNOWS



Photo:

Tanichthys albanoptera

Hendon Aquatic Society

I WAS first introduced to these fish some 12 years ago, when I was informed that they were called "the poor man's neon"; this statement I failed to appreciate, thinking of them as just another pretty fish. Through the years I have kept them and made a few miserable attempts at breeding, using the various techniques described in our reference books and experiences of friends with the same problem.

However, this year has given me an entirely different opinion of the white cloud, for not until you have seen an aquarium full of the young fry can you compare them with their flamboyant relations, the neons.

Breeding was achieved in the following way. A tank 24 in. by 12 in. by 12 in. was set up at right angles to a small window in the fish house. Stones of approximately quarter-inch diameter were used as a base medium, 1 in. in depth. Water was taken from the rain butt and the tap in equal proportions, pH 7.1; depth of water was 7 in. The thermostat was set at 68° F and had an almost negligible fluctuation; the heater was 100 watts. Small plants, mainly *Herposotis* and *Cryptocoryne cordata*, were then planted, leaving one-third of the bottom bare at one side.

Guppies were first introduced into the tank and were fed only with live food for a fortnight. I then removed them and put in eight white clouds that I obtained from various Hendon Club members, mainly to avoid having fish from the same broods. Thus with four females and four males all of adult size and different ages, I left them, trying to hide themselves, to get acquainted with each other.

During the next few days they were fed on white worms and *Daphnia* and could be observed fluttering above the stones, usually in groups of three. On the fourth day young fry were to be seen on the front glass and so preparations for *Infusoria* (from a hay mixture) were put into operation. As the adult fish did not seem to bother about the fry, I left

by KEN GREEN
(Hendon Aquatic Society)

them in the tank and it was not until 14 days later that I removed them; then clouds of fry could be seen swimming with still more in the second-day stage on the glass front.

Feeding of the fry was done in three meal times, and a pint of *Infusoria* medium was given each time, water being taken from the tank to compensate for the increase in volume and this being added to the new culture.

After 12 days the fry were big enough for micro worms, which they devoured enthusiastically, augmented by proprietary fry foods. Aeration was given for 4 to 5 hours a day.

The parent fish, when moved to a similar tank, carried on spawning and I have again moved them where, after 3 weeks, they are swimming about happily with another batch of their youngsters in with them. It will be interesting to see if a complete spawning can be mastered in this way.

Cacti in the Fish House

IF pots of cacti are kept standing in pans or saucers see that there is a layer of very coarse sand or small stones in them so that any surplus moisture from the pot can drain away easily. If there is a window in the fish house the cacti can stand on a shelf in front of this and they will provide shade from the sun during the summer. Do not allow the plants to become covered with dust. Take them outside for a good syringing with water on a warm day.

For Community and Breeding Tanks

by T. ROLAN



Photo:

Schubert's barbs (*Barbus schuberti*)

Lawrence E. Perkins

IT is often recommended that the aquarist should specialise in two or three species rather than to attempt to keep and breed a large number. This is certainly a good plan and one guaranteed to retain one's full interest in the hobby for the greatest time, for there is nothing against the aquarist changing his specialities to some other group of fishes or species after a year or two's experience with his initial choice.

If the chosen species are ones suitable for the community aquarium as well as being reasonably easy to breed this is an advantage, because not only can the stock be housed with the minimum of trouble but also there is likely to be less difficulty in disposing of the youngsters produced, by sale to a dealer. What suggestions can be made to a beginner starting to follow this advice? Amongst the egg-laying species the small barbs are perhaps the fishes most worthy of consideration, and in this article two of these are discussed as examples.

Tiger and Schubert's Barbs

The first is the tiger barb (*Barbus tetrazona*), which I think has few equals when it comes to colour. Now it cannot be denied that tiger barbs can be rather evil-tempered and, as a species, are addicted to fin-nipping. But provided that the tank does not also contain flowing-finned fighting fish (*Betta*) or angel fish they are a bright and active addition to the community and their striking beauty makes them extremely popular with aquarists.

Whether in or out of breeding trim both the male and female tiger barb are brilliantly arrayed, their silvery lengths, offset by red finnage, being banded with the four dark vertical bars.

For a second suggestion, Schubert's barb (*Barbus schuberti*), although a much less striking barb of the smaller kinds, also fulfils the requirements of those wishing to create a colourful and attractive tank. Its light-golden colour looks well against the greens and reds of the foliage, and although not averse to a certain amount of fin-nipping it is on the whole a peaceful companion. There has been some controversy in recent years about whether this fish is a true species or merely a colour variety of *Barbus semifasciatus* (the Chinese barb). The strain was developed by a commercial breeder, Mr. Thomas Schubert, of Camden, New Jersey, U.S.A., from a mutation that appeared in a brood of *B. semifasciatus*. Some ichthyologists, however, claim that this barb differs structurally from *B. semifasciatus* in a sufficient number of ways to indicate that it is surely a different species. In fact, some hold that it most closely resembles *Barbus sachsii*. However, under whatever name it appears, it is a most appealing fish.

Tanks for Barbs

Both *B. tetrazona* and *B. schuberti* grow to a size of about 3 inches and are very active. They require both plenty of swimming space and a reasonable depth of water. Well-planted tanks not less than 24 in. by 12 in. by 15 in. and

preferably 36 in. by 15 in. by 15 in. in size are suitable, and a temperature of 75 F (24 C) is generally acknowledged to give the most activity and intense coloration, though these fish do tolerate a temperature range as wide as 70° to 90° F (21° to 32° C). Start your breeding stock by the purchase of six young specimens of each species. These can be kept with other fishes in the community aquarium until they are of adult size and can be sexed. It is generally considered that fish aged between 9 and 12 months give the best breeding results, but it is more a question of size than of age, and care and feeding determine how soon the best size is reached. When the fishes are ready for breeding the females can be differentiated by their fuller shape, the males by their intenser coloration. Furthermore, in the tiger barb, the ventral fins of the female are only half red. In the groups it will be the females that can first be picked out, for as soon as they begin to feed well their ovaries start to develop and cause a noticeable bulging of the sides of the fish.

Omnivorous Genus

Diet is obviously an important matter in bringing the stock to early maturity. Like others of their genus, the tiger barb and Schubert's barb are omnivorous. They conveniently accept prepared foods, but, in order to reach first-class condition, they require a varied live-food diet. This is essential for the "conditioning period", just before breeding is to be attempted. They should be fed with aquatic insect larvae, *Cyclops*, *Daphnia*, adult brine shrimps, *Tubifex* and mashed earthworms. Males and females are best kept separately during the time the special dietary attention is given (about 7 to 10 days). Another important point that should be remembered is that these fishes consume a considerable quantity of food and should be fed generously. When the youngsters are still in the community tank ensure that they get their full share of the food. The tiger barb does sift through the sand in its search for left-over fragments of food and serves as a scavenger.

When the prospective parent fish have been identified sexually, and their behaviour towards one another in the groups will be another help towards doing this, they will have to be caught for transfer to the separate aquaria for the two sexes or to the breeding tank if the separation is not undertaken. The netting of fish from a community tank

can be a nerve-racking business for fishes and aquarist alike and it is worth taking some care about this, especially when it is hoped that the fish being moved will be ready for breeding in the new tank. Make the move at night, with the minimum of light over the tank; the fish will then be less active and are more easily netted. A large flash-lamp will give all the light necessary for this task.

A breeding tank size 18 in. by 10 in. by 10 in. will be adequate for a trio of fish and should be filled with clean tap water that has stood for about 7 days, and a temperature of 80 F (27 C) maintained. Since both tiger barbs and Schubert's barbs, like others of their group, are extremely fond of their own eggs, the tank must be thickly planted with bushy, fine-leaved plants such as *Myriophyllum*, *Cabomba* or willow moss (*Pocillopsis*), or artificial spawning media can be used, and the bottom should be covered with gravel. When the fish are in condition (indicated by their increased activity and colours) they may be introduced into the breeding tank, the female first, to be followed after a little while by the male, and spawning may begin as soon as an hour later.

Various opinions are held about the best ratio of fish to use for breeding—some advocate two males to one female to give a greater percentage of fertile ova (and this is good policy with Schubert's barbs, as broods tend to be small with a single male); others use two females to a male to ensure that the males do not drive the females too hard, but provided that the female is ready for spawning the strenuous driving she may be subjected to will do no harm. If spawning has not taken place within 3 or 4 hours the fish should be removed.

Breeding Procedure

Preliminary breeding activities will consist of the male mouthing at the female and displaying in front of her. Soon he will be driving her round the tank and a furious chase among the plants will follow. The fish adopt a side-by-side position and several semi-adhesive eggs will fall at a time among the leaves or on to the sides of the tank. Those adhering to the glass will rarely be fertilised. After an hour or two spawning will have ended and at this point brood fish must be removed. Once their excitement dies

Continued at foot of next page



Photo:

Tiger barbs (*Barbus tetrazoni*)

Hendon Aquatic Society



Photo:

Hendon Aquatics Society

Neolebias ansorgei

A SHY member of the characin group is *Neolebias ansorgei*, a fish whose timidity makes it a poor choice for the community aquarium. However, it is not unworthy of attention by the breeder who can keep it alone and give it the peaceful conditions it requires. *Neolebias ansorgei* is found in marshy waters in West Africa and the aquarium cannot be too densely planted to suit it. It is usually recommended that it should be kept at temperatures slightly above the normal range, i.e. at 80° to 85° F (26° to 30° C). Such a high range appears to be necessary for breeding, which although not readily undertaken has been

reported to occur in aquaria.

This fish grows to a length of 1½ to 2 inches and at the full-grown size males and females can be distinguished by the slightly enhanced coloration of the former and the deeper body of the latter, that is by those features so commonly used in sexing the characins. There are no special food requirements, but if the species is kept in an aquarium with other kinds of tropicals it is necessary to ensure that *Neolebias* gets its fair share. Eggs are laid on plants in the thickest clumps and the fry require Infusoria as first food.

For Community and Breeding Tanks

(continued from the preceding page)

down, the parents will start to eat their own eggs most voraciously.

As soon as the parent fish have been removed from the spawning tank 10 drops of methylene blue may be added to the water as a fungus deterrent, and the tank kept darkened. This black-out can then be lessened gradually

during the following week. Hatching takes place some 30 to 48 hours after spawning, though the fry will be seen only with difficulty as they are tiny. For 2 or 3 days they live on the contents of their own yolk-sacs but as soon as they become free-swimming they should be fed Infusoria or egg-yolk infusion. They will grow quickly and within another 5 to 5 days should be offered newly hatched brine shrimps, and then *Daphnia* and a little fine, dried food. After about 14 days the temperature of the water may be reduced gradually to about 75° F (24° C).

THE GOLDFISH AND ITS VARIETIES

No. 3 — Nymph Goldfish

by A. BOARDER

THE nymph is one of the newer varieties of fancy goldfish to be recognised by the Federation of British Aquatic Societies and was brought into the Standards in consequence of pressure from a certain society. The chief reason why this fish had not been recognised before was that it was considered that it could turn up as a throw-out from a spawning of veiltails. It is actually like a veiltail with a single caudal and anal fin.

When breeding veiltails and fantails it is probable that some fish will be found among the fry which have no double tail; these are the worst throw-outs. Others which have joined tails or even tri-tails are not recognised but the one with a single tail can be included as a recognised fish, the nymph. Each year I get a few such fish from my strain of fantails and these are usually given away by me to young enthusiasts and are quite useless to me. I know that in certain quarters the nymph is held as such but I still contend that this fish should not have been given a Standard and recognised, as it is possible to produce it when breeding other varieties of fancy goldfish.

Standard

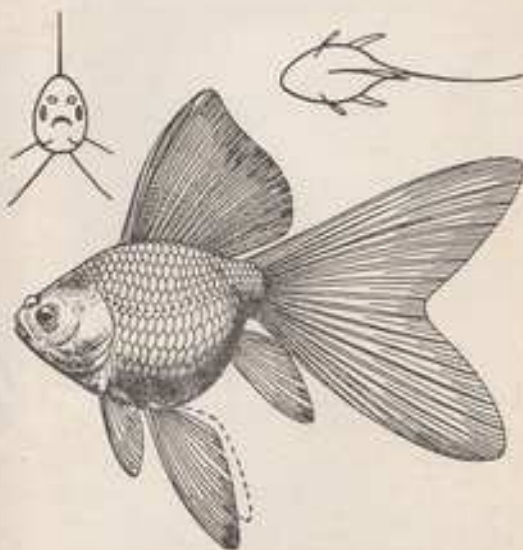
Having had my little say it is now necessary to describe the fish, so that those who favour this type will know what is required for an exhibition fish. In general appearance this fish is like a veiltail with a single caudal and anal fin and can be had in scaled and scaleless patterns. The body should be deep and round, approaching a sphere, with a short broad head. The dorsal fin resembles that of the veiltail, being large and having the front edge-curved back and the back curve slightly concave at first, sweeping to a convex curve towards the body. A very full but erect fin must be possessed by this fish. The caudal fin is forked with the tips rounded and held well spread. The anal fin is single. The pelvic fins are well developed and the pectorals are smaller. The fish is recognised as self-coloured when it is either red or rich chrome yellow. A variegated fish is one with two or more colours in a pleasing pattern (whatever that might be), and the shubunkin type has no visible scales and all the colours as for the shubunkin, i.e. a blue ground with violet, red, yellow and brown over-dappled with black.

The fish should be a fairly hardy one, especially the scaled type, which should be able to withstand winters

out of doors. There are no special methods for breeding this fish but it is essential that as far as possible fish used for breeding should be used only from an established strain. If parents are just picked up haphazardly it is possible that they may be fast line-bred throw-outs from a veiltail pairing, in which case they would carry the genes of inheritance of such fish and be likely to produce many unwanted types.

Sorting Fry

When sorting the fry at an early date it will be most easily done by placing the fish in a white bowl, so that the tails can be examined. Then in a clear glass container the bodies and dorsal fins can be inspected. The fish should be fed on a good all-round diet of animal and vegetable matter: some Bemax or other wheat-germ food, rolled oats, dried brown-bread crusts and dehydrated meats. Garden worms are the finest food for conditioning the fish and these can be varied with white worms or *Tubifex*. Extra feeding should start early in the year so that a good reserve is built up in the breeding fish. If the fish are kept in an outdoor pond they will not breed as early as those kept in tanks in an enclosed place. In the pond spawning may commence in late April if the weather is good but it may be deferred until late June. In fish houses it is possible to make an earlier start and fry from such a spawning have a good chance of growing to a fair size before the winter.



Outlines of nymph goldfish as presented in the Federation of British Aquatic Societies Handbook "Show Standards"

A Thermostatic Aquarium Alarm

by E. J. FERRIS

A PERSON is a happy individual indeed, when he has organized the environment of his fishes to such a degree that all he has to do is find a comfortable chair and enjoy the aquatic beauty of his tank. In this age of automation it is surprising how difficult it is to get special equipment for the aquarium, without wasting a lot of time and money.

The average tropical aquarist is forced to watch that thermometer conscientiously every day, if he values his fishes, which in a large tank can represent a considerable sum. I was a slave to this chore until I installed a simple audible alarm system which costs a shilling a year to operate and has several advantages.

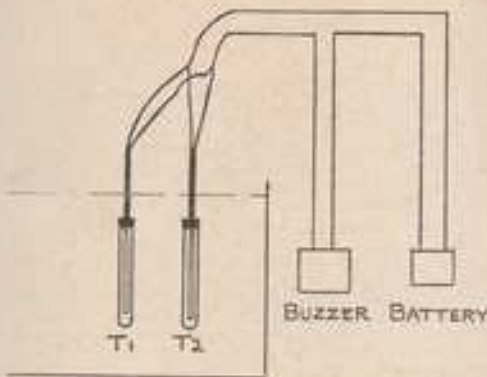
Any housewife who uses an electric iron or a vacuum cleaner will substantiate that a few watts of electricity can make most chores much easier. In this article I will explain how a handyman can make this thermostatic alarm for as little as 30s.

The wiring diagram is similar to that given in an article by R. E. Macdonald in *The Aquarist* (November, 1964), except that I use two thermostats in my system, one of which is modified. The alarm consists of two submersible thermostats, a miniature buzzer and a 4½ volt bell battery.

Aquarists keeping tropical fishes know that a thermostat is an electrical switch in which the heat-sensitive part is generally a bimetal strip. One end of the bimetal strip is fixed, leaving the other end free to move under the influence of temperature changes. The normal thermostat closes and makes electrical contact on a lowering temperature, so the only device that has to be made is a thermostat that closes on a rising temperature.

This thermostat is made by carefully removing the bimetal strip or arm, annealing the bend area in a flame and bending it again in the opposite direction, so that the inside of the bend is now the outside. The thermostat is then reassembled and corrected to its original shape and action. We then have a thermostat that is opposite in action to the normal, and will close on a rising temperature. The bimetal arm should be bent to make contact at approximately the correct temperature, the final adjustment being made with the adjusting screw, which should then be locked.

With the thermostat held in a steady vertical position in a jar of water, it is surprising how consistent is the temperature at which it makes electrical contact. Polish



Arrangement of the two thermostats (T1 and T2), buzzer and battery

and clean the modified thermostat so that the bimetal strip will not corrode.

Adjust the normal thermostat to close at a few degrees below and the modified one at a few degrees above, the temperature at which the tropical tank will operate. Wire up and tape the thermostats and finally hang them behind a piece of slate or marble in the tank.

One technical point: the differential temperature should be reasonable, say 5°F (3°C) (this is the difference in temperature that causes the thermostat to make and to break electrical contact). A little experimenting will show that this is controlled mostly by adjusting the influence of the small magnet on or close to the bimetal arm of the modified thermostat.

This alarm is independent of the electricity supply and can be checked anytime.

It remains only to put that thermometer away in a safe place out of sight, knowing our tropicals are watched over by a silent alert guard who will be on the buzzer the moment trouble is suspected.

FISH PARASITES—4 Anchor Worms



Anchor worm (magnified)

ANCHOR worms (*Lernaeocera*) are worm-like parasites that possess appendages at the head similar in shape to those of a ship's anchor. They grow to about

½ inch in length and will injure the fish by penetrating the skin and burrowing into the muscles. For this reason, the anchor worms should never be removed with forceps until they have first been killed, for serious wounds will be caused if the anchor-like head is torn from the body of the fish. These wounds will then leave the fish open to bacterial and fungus infections.

Anchor worms may be killed by brushing their bodies with a strong solution of potassium permanganate. Care must be taken, however, to prevent this solution from touching the skin of the fish. After the worms have been killed and removed from the body, the marks caused by the worms may be disinfected by painting with a 2 per cent solution of mercurochrome.

R. E. Macdonald

British Reptiles and Amphibians

by ROBERT BUSTARD, B.Sc.

(Photographs by the author)



Alpine newt (*Triturus alpestris*). An attractive small species (not British)

APRIL is the earliest month in which a definite start can be made to stock the outdoor reptiliary, and the hardest species are, of course, our native animals, which are also those most likely to come first to the notice of the beginner. British reptiles and amphibians are therefore the subject of this article.

I would say, at the outset, that there is much room for personal preference. Many people keep a mixed collection of reptiles and amphibians in one reptiliary, and this can be done successfully if the lay-out is considered in detail and the actual species chosen for inclusion are selected with care. As a general rule reptiles like sun and dry conditions, amphibians detest sun and must remain moist if they are to live. This rule holds good for all the British species as, despite the fact that the grass snake often enters the water or is seen in wet places, it must have access to warm dry areas if it is to live. The natural food of the various animals kept must also be remembered: grass snakes (*Natrix natrix*) feed to a large extent on our native frog (*Rana lessonae*), and it is hopeless to try to keep these in the presence of even a single adult grass snake.

Lizards

Let us consider first the lizards, of which there are three native species. The common lizard (*Lacerta vivipara*) is an excellent species to keep. It does well even in a fairly small vivarium indoors provided that this receives sun or artificial light, and in an outdoor reptiliary is a constant source of pleasure. The common lizard is brown with some black markings. Melanic (black) specimens are not

unknown but are by no means common. The ventral region in the female is yellow, and in the male is orange or even tinged with red. This 6 inch lizard is an excellent species with which to begin and can be collected in many parts of our islands. When catching a lizard make one sudden very rapid movement and be sure to grasp the animal near the head end, as if the tail should be grasped this will be broken off and left in your hand while the lizard makes its getaway, and it regrows its tail in time. It is useful to know that these lizards have favourite basking sites, so if you miss it at the first lunge do not pursue it into cover where your chance of finding it is very small, but wait and it will soon reappear, when you can try again.

The common lizard is insectivorous and will eat almost any live food. Small earthworms are not really enjoyed and centipedes are rejected, but geckles, flies and blue-bottles of all sorts, non-hairy caterpillars and mealworms will all be eagerly eaten. Like most lizards they consider spiders to be a great delicacy. During the day they spend long hours basking in the sun with their bodies flattened and angled to the sun to absorb as much of its warmth-giving rays as possible. Lizards, like all reptiles, are cold-blooded, which means that within certain limits they take their body temperature from their surroundings. At night-time they retreat under moss or stones and suitable hiding places must be provided in the reptiliary.

The next British lizard is the sand lizard (*Lacerta agilis*), which is now so restricted in its range in this country that collectors should not try to procure British specimens. This applies even more particularly to the rare smooth



This common lizard (*Lacerta vivipara*) has lost part of its tail, but new growth is taking place.

make (*Coronella austriaca*). Herpetologists should learn from the experiences of ornithologists, who have found that whenever a bird becomes rare on the British list, it is persecuted by egg collectors and others that unless it is strictly protected it is soon extinct. These two reptiles will therefore be considered in the next article as Continental reptiles.

The British lizard which is found throughout the country is a legless species, often mistaken for a snake. It is the ill-named slow-worm or blind-worm (*Anguis fragilis*). This is a burrowing reptile, although it does like to bask in the sun, and in my opinion is not really suited for the outdoor reptiliary, where it will be seldom seen, although it will certainly thrive there and produce its young. Like the common lizard, it brings forth its young alive, but whereas a litter for the common lizard will average about five, the slow-worm may produce about twice this number, although the possible range is very wide. The food of the slow-worm is earthworms and slugs; only white slugs are acceptable.

Snakes

I cannot recommend keeping poisonous reptiles, and the adder or viper (*Vipera berus*) is not a particularly inspiring species to have in confinement. It will usually refuse to feed in captivity, although in a spacious outdoor reptiliary it can often be kept quite easily. The grass snake (*Natrix natrix*) is widely kept and indeed many Continental specimens are imported each year, so that it will receive further attention in the next article. It is a very docile species and its only unpleasant habit is to emit (from glands near the anus) a very nasty smelling substance which has a most persistent odour, and for this reason should not be allowed to get on to clothes. This habit is one of fear, however, and captive snakes soon lose it. Food is largely frogs, as mentioned above, to which newts (with the exception of the crested newt) can be added. Small specimens will accept tadpoles. The average length of a British grass snake is between about 24 and 30 inches.

Frogs and Toads

Turning our attention to the amphibians we find, apart from the common frog which lives well in any damp corner of the garden and can be fed upon any moving creatures of suitable size, two imported frogs which must now be counted among the British fauna. They are the edible frog (*Rana esculenta*) and the much more recent addition the very similar if somewhat larger, marsh frog (*Rana ridibunda*). These frogs seldom venture far from water. I should hesitate to keep them in an enclosure with much smaller specimens than themselves. This applies par-

ticularly to the marsh frog, which has definite cannibalistic tendencies.

The common toad (*Bufo bufo*) to my mind is more a garden friend. For many years we have had specimens living at liberty in the garden, each with its home in the rockery or greenhouse. So often these specimens turn out to be females. They certainly are creatures of habit and one can prophesy where they will be in the evening when they come out to feed under cover of the dark. One specimen regularly entered and left the greenhouse by the same route. The common toad is an excellent climber and a welcome addition to any garden because it destroys harmful grubs and slugs. It loves to roam and I have never enclosed them in any way.

Our other native toad is the natterjack (*Bufo calamita*). This toad is attractively marked in green on a putty coloured or brown background and has a dorsal gold stripe in the centre of the back. It owes its alternative name of running toad to its habit of progressing in short runs like a mouse, whereas the common toad crawls slowly, with frequent rests unless disturbed. This pretty creature takes well to captivity and is certainly to be recommended. It feeds readily on the usual food.

Newts

In Britain there are three species of newts, all of which are widely distributed over the country. The largest, by far, is the great crested newt (*Triturus cristatus*). Its Italian sub-species, *Triturus cristatus borealini* (being more aquatic), is often imported. The crested newt measures about 6 inches and is black above with a yellow belly mottled with black. In the breeding season the male develops an impressive notched crest and a blue band along the sides of the tail. On emerging from hibernation the crested newt goes to the water, where it will remain until about July. The other two newts, the smooth (*Triturus vulgaris*) and palmate (*Triturus helveticus*), are 4 inches and 3 inches respectively and are much less aquatic, especially the smooth (also called the common) newt. When out of the water they tend to hide away under stones or in damp moss and therefore they are not very decorative for the outdoor reptiliary.

Prices

For collectors who are unable to collect British species for themselves I am quoting the average prices for which they may be purchased at present: common frog, 1s. 9d.; common toad, 1s. 9d.; natterjack toad, 6s.; edible frog, 2s. 3d. to 5s.; great crested newt, 2s. 6d.; smooth newt, 1s. 3d.; palmate newt, 1s. 6d.; grass snake, 6s. 6d. to 8s.; slow-worm, 3s. 9d. to 5s.; common lizard, 2s. 9d.

Where more than one price is quoted this means that the cost varies according to size.



Great crested newt (*Triturus cristatus*) in breeding condition. This male shows the high notched crest and has a pale blue stripe on the tail.

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

Are the so-called freshwater sharks (*Labeo*) long-lived, inoffensive and easy to cater for in the matter of temperature and food?

Generally speaking, these attractive members of the family Cyprinidae are as long-lasting as catfish and the larger cichlids, that is if they are given plenty of swimming space, in well-oxygenated water, and ample food. They flourish best on a diet rich in live and green food (mossy algae). They are not quarrelsome, and a temperature range of 68-85°F (20-29°C) suits them very well. Nevertheless, as some of them exceed 8 in. in length they can become something of a problem in a community tank.

Every time I dip my hand into my aquarium I feel a prickling sensation in my fingers. Do you think the heater, an old one, is faulty, and, if so, could it prove dangerous to anybody attending the fishes?

There is probably a leakage of current through the heater cable. The best thing you can do is to fit a new heater as quickly as possible. There is no need to throw the old heater away, for some firms undertake to recondition them for a small charge. Electric shocks from an aquarium can be prevented by running a stout copper wire from the frame to earth. It is certainly dangerous to use faulty electrical equipment in the aquarium.

The angel fish in my community tank are suffering from frayed and decaying fins. Please can you tell me the cause of this trouble?

Frayed and decaying fins may result from persistent nibbling at them by other members of the community. Needless to say, persistent fin- and body-nibblers can be a source of great trouble (until discovered and removed) in a tank. Alternatively, fin troubles are often brought on by deficiencies in a fish's diet or an unsuitable environment. Keep your angel fish in clean conditions at a temperature above 70°F (21°C) and see that they get plenty of live food or scraped red meat. It is possible that the condition will right itself within the space of 2 or 3 weeks. If it doesn't, swab the fins with a solution of 1 part of water to 1 part of hydrogen peroxide (20 volumes).

Is it really necessary to fill a tank with water and leave it for several days before introducing the plants and fishes?

A tank can be filled, planted and stocked with fishes all in a single day, but the sensible thing to do is to allow the water and plants to settle down for a week or so before introducing any fishes. Further, plants root more readily in water that has stood for a while than in water fresh from the tap.

The water in my recently set up aquarium has taken on a milky appearance. Is this an indication that something has gone wrong and that it needs changing?

Not necessarily, because water straight from the mains undergoes several changes before it finally assumes that gin-like clarity which is so pleasing to the eye. All the same, a milky appearance can be caused by an excess of bacteria produced by overfeeding, especially of dried food. Among other sources of milky water are a compost containing fragments of shell or limestone, or rockwork that is strongly alkaline. If your compost and rockwork (if any) are not of the calcareous or crumbly kind, and you have not been feeding too heavily, do not worry about the water's appearance unless the fishes start to gasp at the surface, in which case supply artificial aeration or a complete change of water (at exactly the same temperature) with the least possible delay.

Can you tell me a way to make a breeding trap for livebearers which does not necessitate using glass tubes or pieces of slotted or perforated perspex?

Many queries from readers of "The Aquarist" are answered by post each month, all aspects of fish-keeping being covered. Not all queries and answers can be published, and a stamped self-addressed envelope should be sent so that a direct reply can be given.

Small-meshed nylon netting attached in the form of an open-topped bag to an aluminium or stainless-steel wire frame makes one of the most satisfactory breeding traps for livebearers.

A few weeks ago I bought several young *Apoistogramma venustum*, and now should like to know how one can tell the sexes apart.

In mature fish, the male has a fuller and lyro-shaped caudal fin, and brighter markings on the head and sides.

A local dealer is exporting some kongo cichlids. Kindly inform me whether the kongo cichlid is a new species, or a long-domesticated species masquerading under a new name?

The name 'kongo cichlid' is sometimes applied to the handsomely marked but vicious tempered *Cichlasoma nigrofasciatum*. This fish is also known as the zebra cichlid, the black-banded cichlid and the nigger cichlid.

How often should the carbon be replaced in a filter chamber?

In a dirty aquarium the carbon should be changed for fresh every few days. But slimy carbon can be made fit for further service by stirring it well in hot water and then spreading it out on top of a hot stove or in the sun to dry.

Is it true that livebearers can change their sex?

It is true that some livebearers, but not all livebearers, can change their sex. The livebearers most likely to change their sex are female mollies and swordtails.

I have an aquarium with cracked sides. How can I soften the rock-hard cement so that I can clean and replace the frames?

Prod holes in the cement with a sharp-pointed instrument and then sprinkle them with paint stripper or warm kerosene oil. After a while the cement will soften sufficiently for you to loosen it and prise out the glass panels from the frame.

My female guppies are becoming very hollow-looking. What is the cause of this "cave-in" appearance?

Guppies are short-lived fish, and seldom live longer than 2 years. As the females produce lots of broods during their short life time, they grow very weak as they approach the end of their days and quickly go into a decline. So the hollow appearance may be taken as a sign of old age. At the same time, a low temperature and insufficient food will soon cause a young female to "cave in" and die within a very short time.

Are *Epiplatys chaperi* easy to keep and breed?

These little fish are easy to keep and breed. A temperature range of 72-78°F suits them best. Any small live food, dried food or tiny pieces of red meat or shredded shellfish (frozen or fresh) will be eaten. The eggs are deposited in masses of vegetation, usually quite close to the surface, and the parent fish do not worry very much about the eggs or fry. The species likes some sunlight, or bright electric light overhead.

I am thinking of placing a 36 in. tank in an alcove beside a fireplace. Would two 25 watt electric lamps kept slight for 8 hours

every night provide sufficient illumination to maintain a healthy growth of plants?

We think you will need two 60 or 75 watt lamps to keep your plants alive. An aquarium placed in an alcove beside a fireplace seldom receives much natural light.

Please tell me something about the bluefish.

Chloropoma gulosus, commonly called the bluefish, is native to the south-eastern United States of America. It needs plenty of space in well-oxygenated water maintained at about 66-74°F. It can be bred in captivity, and scatters its eggs in tangles of plant life. The young, like the adults, will accept dried food as well as live food.

Noticed bubbles arising from the corner of my aquarium, and when I disturbed the compost with a dip tube a whole lot of bubbles appeared and burst at the surface. The compost was black beneath the top layer. What is wrong?

You have probably been feeding the fishes too heavily, and the uncast food has worked its way into the compost and decomposed there. The best thing you can do before the foul condition spreads, and upsets the balance of your aquarium, is to remove the blackened compost with the aid of a tablespoon, and replace it with fresh compost. You can leave the blackened compost on a sheet of paper in the open air for a few days, well wash it and then return it to the aquarium.

The latest addition to my tropical aquarium is a black shark (*Labeo chirocentrus*). Please tell me something about this fish's feeding habits, temperature requirements and general behaviour in the aquarium.

The black shark will take any type of live or dried food, and some vegetable matter such as mossy algae. It has a temperature range of about 65-85°F. It is inoffensive and in its smaller sizes makes an interesting occupant for a community tank. But when it grows to a length of 6 inches or more it stirs up sediment and is really too clumsy for the community tank containing small fishes.

I cannot keep my *Plecostomus* catfish supplied with algae, and it does not seem to take to the dried or live food like other fishes. What else can I use to keep this catfish adequately nourished?

Plecostomus catfish will eat cooked spinach, turnip tops or other soft greens. It will usually eat *Tubifex* worms dropped into the aquarium last thing at night when the other fishes have stopped eating and are resting.

Is the opaline gourami suitable for a community tank housing a collection of the smaller fishes?

Young opaline gouramis are perfectly satisfactory in any community tank, but as they grow they often develop into spiteful bullies. Nevertheless, unless your fishes are very small, the opalines are more likely to harm one another than other members of the community. Male opaline gouramis can be most cruel to their mates.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I have two tanks of fishes in an outhouse which has a glass roof and a large window. I cannot keep the glass of the tanks and the water from going green. What can I do to prevent this?

The green algae which cloud the water and cover the glass are encouraged by bright sunlight; algae just will not grow in the dark. The remedy is easy. Wrap the tanks round with dark thick paper and cover most of the top of the tanks with either duck-weed or one of the floating plants, which help to shut out much of the light. You could permanently black out the backs and ends of the tanks and leave the front glass with a temporary cover. Then when you wish to see the fishes the front cover can be moved. The water will then stay quite clear and the fishes will not be harmed in any way.

I have a 4-pound tench in my pond and it has several worms hanging from its body. The pond is fed with rain water from a garden shed. I do not know whether the tench is male or female. What can I do to kill the worms?

The trouble with the fish is either anchor worms or leeches. You can give the fish several baths in a solution of a half-teaspoonful of Dettol to a gallon of water. It may take some time to clear the fish. The pond may need a good clean out and I do not like your idea of running in water from the roof of a garden shed. All roofs get polluted with soot and filth and this is then washed into the pond. It will be better to let this water run to waste rather than catch it in your pond. You can tell the sex of your tench by examining the pelvic fins. The male tench has the lower rays of these fins thickened and the fin is incurved like a spoon. Many years ago I exhibited a fine specimen of green tench which I had bred. The judge passed it by because he said it was misformed. He did not know that the fish was a male and the thickened fins were a sign of this and not malformation!

Could you please tell me whether it will be safe to keep two nymph goldfish in my outdoor pond for the winter or should they be brought inside and put in a tank?

The nymphs you have may have been warm-water bred,

and they may be in trouble during a bad winter if left in the pond. Some nymphs can be the throw-outs from either fantails or veiltails, although some are bred from other nymphs. If the fish were from a fantail strain with hard scales it is quite probable that they will withstand the cold in an outdoor pond quite safely. If they are from a veiltail strain without the hard scales they may not stand the cold as well. The flowing finnage would be very prone to become attacked by fin congestion, fin rot or fungus.

I would like to make a small pond in my garden by sloping an old bath and stopping up the drainage hole. Would I be able to keep fantails, veiltails and moors all the year round in such a pond?

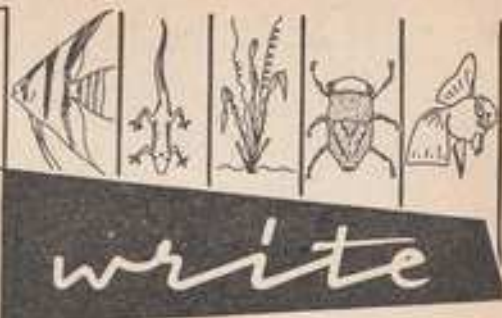
I imagine that in Glasgow you will get bad frosts in the winter which could freeze the water almost solid in such a pool. If you are able to take the fish indoors for the winter they would be all right for the warmer weather. Fantails would be the best type to keep. If a small heater could be placed in the pool for the winter it would obviate freezing up.

I have a large blue-green carboy, about 2 ft. 6 in. high, 1 ft. wide and with a neck only 2 in. in diameter. I would like to convert it into a lamp and an aquarium. What are the spots apart from heating, aeration and feeding?

The chief snag would be that as the neck is so narrow it would be difficult to service the jar as a tank containing fish. However, it would be possible to so fit a lamp socket in the top which could be removed like a cork; it should have air-holes in it. I should think that it would be better as a cold tank, which would obviate the necessity of a heater, thermostat and thermometer. You would have to introduce some soil and compost in the bottom and a few cuttings of a good water plant, say *Hydrophila polysperma*. Have only two or three small goldfish and you could get the carboy to function but you would have to be careful with feeding as it will not be easy to clean the tank out.

our readers

Readers are invited to express their views and opinions on subjects of interest to aquarists. The Editor reserves the right to shorten letters when considered necessary and is not responsible for the opinions expressed by correspondents.



Address letters to The Editor, *The Aquarist*,
The Butts, Half Acre, Brentford, Middlesex

Kings amongst Tropicals

FOR the last 10 years I have faithfully read *The Aquarist* line by line, page by page, back to front, upside down and sideways. I have won prizes at shows at Accrington, Blackpool, Bolton, Bury, Belle Vue, Birmingham, Colne, Merseyside, Oldham, Rochdale, Skipton and the British Aquarists' Festival. During this time I have seen some of the most outstanding fishes in the north of England, such as the P. Ardensis at the Blackpool Show, the pike cichlid at the Bradford show, the silver shark at Oram, the black sword at the B.A.F. and the *Etodon paradisi* that once lived in Burnley. These, Mr. Chadwick (*The Aquarist*, February), are the kings and queens of the aquarium! If you had seen a 4 foot tank, well planted, with two adult pompilous fish each the size of a dinner plate gently swimming back and forth, or a shoal of *Nerobranhios* at spawning time I feel that you would soon change your mind and also your fish! I have seen some good guppies, the *Hanels*, the *Arnolds* etc., but to compare these with the phantom terns, the dwarf gourami or *Apistogramma nana* is like comparing the Burnley and Accrington football teams.

L. LEWIS,
Secretary, Burnley Aquarist Society.

Hawaiian Mouthbreeder

I WAS very interested to read the article referring to Hawaiian mouthbreeders in the December, 1961 issue, especially as I had just purchased one pair.

I can, however, report more success than the writer of the article. My pair performed in exactly the same manner as stated, but they actually laid eggs and these were fertilised. The female was then found to be hiding in the plants. I removed the male and left the female in quiet solitary confinement. It is now a fortnight since the eggs were laid and I am pleased to report that the female has hatched out a happy brood of youngsters. I feel that this letter will be of interest to the writer of the article if he is still having no success.

J. LEE,
Maudsfield, Cheshire.

Centigrade not Wanted

MAY I appeal to all readers to ignore the proposed introduction of the centigrade temperature scale into this country. It is said that "old dogs cannot learn new tricks", but I would be quite prepared to try provided that the new trick was better than the old. In this case it is

not so. The Fahrenheit instrument is far more efficient, by 80 per cent., than the centigrade. For fine work the latter is a very poor substitute for the former. Who are these people who are trying to kick us around? Who is likely to reimburse all the people with Fahrenheit thermometers? I imagine all the hospitals, doctors and nurses use Fahrenheit thermometers and there must be thousands in use throughout this country.

I was surprised to find on a check-up that I had no less than ten instruments marked with the Fahrenheit graduation. I have one on a barometer in the house, three maximum and minimum thermometers (one in an outside frame, one in my greenhouse and one in a seed propagating frame), I have a clock type in the greenhouse for easy reading, an unmounted, long type for the testing of water temperatures connected with fish breeding and a special one for testing hot liquids and for sterilising soil. Then I have three horticultural thermostats all in use and under Fahrenheit markings. To replace these would probably cost me at least £15 to-day, and who is going to pay this? I for one shall absolutely ignore the proposed change-over to a far less efficient instrument which has no advantages whatever over the one in common use in this country to-day.

A. BOARDER,
Ruislip, Middx.

I WOULD like to point out an error in Table 2 of my article "Fahrenheit or Centigrade?" in your February issue.

The top set of figures, as published, reads "... 80 90 100 110 120 130 ..."; this, of course, should read "... 80 90 100 110 120 130 ...". The error is obvious to anyone who makes a check on boiling point.

P. LEE,
Accrington, Lancs.

We apologise for the error introduced in the publication of the Table and give the corrected version below.—EDITOR.



House-Plants in the Fish House
ON reading through my last article entitled "House-plants in the Fish House" published in the February issue I came across an error in fact. When dealing with the composition of John James compost I gave the amount of chalk to be added as 4 ounces to the bushel. This should read 1 ounce to the bushel.

Please accept my profound apologies and extend them also to the readers of *The Aquarist*.
 BARRY R. JAMES,
 Cheltenham, Glos.

In the Spring . . .

IN the spring all gardeners get fresh inspiration and interest as they contemplate the expected new growth in their gardens. The fortunate owner of a garden pond usually has these interests and the added one of wondering whether the fishes will breed or what fresh activities will occur among the other inhabitants of the pond. I consider that any garden of medium size is incomplete without a pond and even a small pool can give great pleasure to the owner.

The water lilies will be sending up their fresh leaves before flowering and it is now that any divisions can be made before the plants grow too many leaves. Most water lilies can be divided when they are over 3 years of age. The stock can be cut through with a sharp knife but be careful that the bud stems are not broken. As is the case with most herbaceous border plants, it will be found that the outer and younger crowns will be the best for re-planting. Do not keep the plants from the water long enough for them to dry out. When re-planting use an old turf for compost and tie the root-stock in the pot so that at a later stage the whole will not leave the pot and float to the surface.

Watch goldfish for any signs of fungus that sometimes affects them at this time of the year. A sickly fish usually sulks away from the others in the pond. A fish affected by fungus shows white cotton-wool-like patches and unless quickly treated may succumb. Place the fish in a solution of a tablespoonful of salt to a gallon of water and keep it out of the sun for a few days. When the trouble clears up add fresh water to reduce the salt content gradually. Do not return the fish to the pond until the damage has healed.

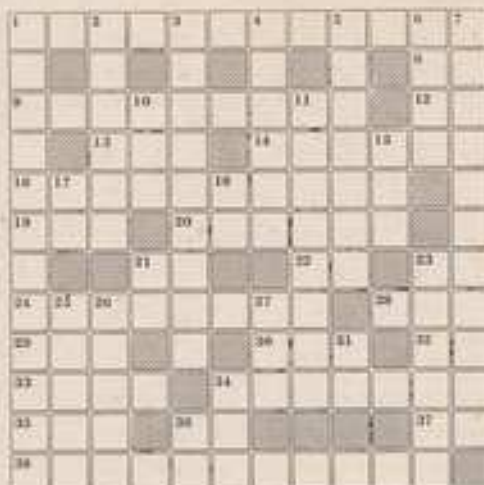
Frogs, toads and newts may have entered your pond to breed in the last few weeks, and will do little harm. A male frog has been known to clasp a fish and harm it but this does not often happen. The tadpoles of the frogs will make good food for the fishes later on but toad tadpoles will not be eaten. Newts can eat small fishes, and their larvae or tadpoles will eat very small fish fry. Newts may be caught from the pond with a net if you wait for them to come to the surface for air.

Do not give too much dried foods to the fishes as there is usually some form of life in the pond for them to find. The best food for most pond fishes is the garden worm. Large goldfish have a liking for stale brown bread, and if a piece is thrown on the water the fish will provide quite an entertainment in their efforts to eat it.

Astilbes

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- 1, 34. Blind cave fishes of Mexico (12, 7)
8. Motoring association (1, 1)
9. Substance prepared from the swim bladder of mackerel (9)
12. Disc of a sort (2)
13. This girl must be some sort of star (3)
14. May be used on exterior of tank but may be rusted (6)
16. Yet, O terra (anagram) (10)
19. Whale (3)
20. Insect of the order Coleoptera, sometimes aquatic (9)
21. Size in a most irrelevant manner (2)
22. Leading journal body (1, 1)
23. Pentastem episcopal (1, 1)
24. See 1 Down (8)
26. Catch or sack (3)
29. Alcoholic drink in Polynesia (3)
30. Poetic part of you (7)
31. Not out of a part (2)
33. American antacid (4)
34. See 1 Across (7)
35. Moss West (3)
36. Mixed type (2)
37. Tharda in a colloquial manner (2)
38. Bearing both male and female flowers (12)

CLUES DOWN

- 1, 28. A peccable dwarf ichthid (12, 8)
2. Cavity in the ovary which contains the ovum (6)
3. Get rib bar for tropical ferrous-ite (3, 4)
4. This of the deep could be a bubble nest (8)
5. Hanging ornaments such as a bunch of silver cords (7)
6. American university (4)
7. "Cotton-wool disease" of fishes (11)
10. Fruit with a hardened pericarp (3)
11. More salary (8)
15. Banner of stick rope or chain (3)
17. Expression of hesitancy (2)
18. Old English (1, 1)
19. Aa 38 Across (2)
25. Colours (6)
27. Pertaining to birds (5)
28. Put together for breeding purposes (3)
29. Collection of living crustacea, sponges, etc. it includes aquaria (5)
31. In red ink it marks a bonnet (1, 1)
34. Dance (3)
38. River in China and in Italy (2)

(Solution on page 28)

News from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 5th of the month preceding the month of publication.

THE officers for this year of the Kingston and District A.S. are as follows—Chairman, Mr. H. E. Woods; Treasurer, Mr. S. L. Barber; Show Secretary, Mr. H. T. Towell; Hon. Secretary, Mr. G. E. Jones, 74, Ellingham Road, Long Ditton, Surbiton, Surrey. The only change from last year is the Secretary.

The Society would be pleased to hear from anyone who is willing to come and give a talk on any subject connected with the hobby in any way. Also information would be welcome about films or slides that are available. The Inter-Club Open Table Show will be held on the 25th September.

THE following Officers and committees were elected at the annual general meeting of the Bedford and District A.S. Chairman, Mr. J. J. Banks; Hon. Secretary, Mr. R. Hayson, 25 Avenue Road, Hushden, Northants. Hon. Treasurer, Mr. G. Booth; Show Secretary, Mr. G. Davies; Members of the committee, Messrs. Merrill, Archer, Thompson and Godwin.

At the March meeting a table show was held. The classes were A.V. Livebearers, A.V. Cichlid and A.V. Freshwater. The results were as follows: A.V. Livebearers—1. R. Hanson (Lilberry melon); 2. and 3. D. Ward (Venturo platy); 4. B. Thompson (Black molly); A.V. Cichlid—1. T. Dardis (Angel Fish); 2. Mrs. Hill (Blue Acara); 3. T. Dardis (Angel Fish); A.V. British Freshwater—1. and 2. J. Burke (Rooch); 3. B. Smith (Hussak).

During the holding a Quiz was held, and after this Mrs. Meadows answered members' questions.

The Society meets at the Guild Hall, Harper Street, Bedford and all visitors are welcome.

THE Dunstable and District A.S. is now meeting on the first Tuesday of each month at Beech Hill C.S. Girls School, Dunstable Road, Luton, at 8 p.m. and visitors are welcome. At the annual general meeting the following officers were elected for the coming year—Chairman, Mr. M. Dixon; Vice-Chairman, Mr. D. Broomfield; Treasurer, Mr. A. Buchanan; Secretary, Mr. R. Gilbert, 95, Lockington Crescent, Dunstable; Show Secretary, Mr. E. Baines; Librarian, Mr. J. Lewis; Committee Members, Messrs. M. Green, G. Dell, K. Ward, J. Broomfield.

Mr. John Long, the Society's President, presented the following awards for 1961—Mrs. E. A. Green Cup—Mr. J. Baines; Phil Smith Cup for Novice Trophy—Mr. E. Ward; Tropical Plants Cup—Mr. M. Dixon; Franklin Shield—Mr. R. Gilbert.

AMONG some of the structures at recent meetings of the Yeovil and District A.S. have been fish slides of numerous Tropical Fish in full colour and some fancy waterbury fish with a conestory on top by Mr. Stanley Langdon. A "pick the names" contest was held at the same time to test the knowledge of the members. This proved so successful that the Society is prepared to loan some out to other Clubs to help them solve a blank evening.

Recently Mr. Norman Bennett of Weymouth gave the members an interesting talk on Pond Plants with coloured slides to show off their beauty. There were good attendances at both meetings.

AT the annual general meeting of the East London Aquarists' and Pondkeepers' Association, the election of officers resulted as follows—President, Mr. P. S. Caspary; Vice-President, Mr. F. Arnold; Chairman, Mr. R. Dodkins; Vice-Chairman, Mr. W. Gaby; Secretary, Mr. R. Emery, 44, St. Ebbewood Road, Barking, Essex; Assistant Secretary, Mr. E. J. Myers; Treasurer, Mr. A. Harris.

SOME visitors are joining from Coventry Pool and Aquarium Society administration this year. Mr. G. Glover the Chairman for four years and three committees, Mrs. Mervy, I. Ellis, R. Hunt and G. Preece are all missing from this year's line-up, and sincere thanks has been accorded them for their untiring help.

President, Mr. P. O. Smith; Vice-President, Messrs. C. A. Eason, T. Eason, J. R. Sturton, W. T. Oliver; Chairman, Mr. J. Grant; Vice-Chairman, Mr. F. Prescott; Hon. Secretary, V. Workman, 204, Norman Place Road, Coventry; Treasurer, Mr. H. Coats; News Editor, Mr. P. Randall; Committee, Messrs. L. C. H. Smith, C. Farrow; Show Judges, Messrs. L. C. H. Smith, H. H. Stock, R. G. Stock. Recently the members had a talk from Mr. S. J. Ryan on the possibility of making fishkeeping a profitable sideline. He stressed the necessity of specialising in one type of fish and suggested that among the most profitable would be snails and blue

guppies but it was also suggested that any financial reward should be incidental to the pleasure of keeping fish.

THE Mansfield & District A.S. held its Annual General Meeting recently when the following officers were elected: President, Mr. G. L. A. Wilton; Chairman, Mr. A. J. Baker; Hon. Secretary, Mr. A. Atkins, 81, Windsor Road, Mansfield; Treasurer, Mr. R. Heath; Committee Members, Mr. C. Hughes, Mr. J. Richardson, Mr. R. J. Pugh. Following the Annual General Meeting the Annual "Fish of the Year Show" was held for the "C. Hughes Cup". This show was won by Mr. R. V. Dyson for the second year running the winning fish being a fine specimen of the *Rita Lebackera*, a tropical fish from East Pakistan, and found in the slow flowing rivers. Second was Mr. J. Bowyer with a *Pterapichia Cichlid*. Meetings are held at the "Crown Hotel" Stockwell Gate, Mansfield on Monday evenings at 7.30 p.m. at the rate of two meetings every five weeks, starting with the first Monday of each month.

THE Salford A.S. and the Lancashire section of the Fancy Guppy Association are combining their Open Shows, on Sunday 26th May. All classes of fish will be entered for, fish to be housed in suitable containers. Showing will take place from 11 a.m. till 2 p.m.

A fully licensed bar will be available along with the usual refreshments. While the judging of the fish takes place contestants and friends will be entertained in the new club room by a lecture and film show. Gold Medals and P.O.A. cards will be awarded for First where applicable. The address is Con-Op Social Club, by House, 58 Bolton Road, Pendleton, Salford, 6, just past the Woolpack Hotel, Bores 37 and 77 from Manchester stop at the door.

AT a recent meeting of the Northampton and District A.S., members were addressed by Mr. Max Gibbs, a professional aquarist from Oxford, his talk being on sea-water aquaria.

He explained the making of artificial seawater, the types of marine fish available, and exhibited various types of coral. Table these results for the month, for Cichlids, were: 1. Mr. R. Shindley; 2 and 3. Mr. B. Pimm.

SOCIETIES requiring to hire slides and tape recordings of interest to aquarists are invited to take advantage of this service offered by Hendon and District Aquatic Society.

The service secretary, to whom application should be made, is Mr. J. Morris, 124, Nelson Road, Hornsey, London, N.6.

THE Freelance A.S. welcomed in their first March meeting Mr. A. Cooper from Condon who interested all members on the subject of water conditions and how to test for pH and hardness. This was followed later in the month by a talk by Mr. F. Riddle of Hendon on "Live Breeding the Guppy". Mrs. Riddle was also warmly welcomed by all Club members.

THE Association of Yorkshire A.S. is holding its Second Annual Open Table Show on Sunday, 6th May, at The Drill Hall, Mill Lane, Tadcaster, Yorks.

The hall will be open from 10 a.m., all exhibits to be closed by 2.30 p.m., when judging will commence. Judges: Messrs. I. Skinner and D. Duerford; Classes: 1. Livebearers (Single); 2. Barbs (Single); 3. Characins (Single); 4. Acaroids (including Guppies); (Single); 5. Fishes (Single); 6. Cichlids (Single); 7. Catfish and Loach (Single); 8. Carps and Minnows (Single); 9. A.O.V. (Single); 10. Breeders Livebearers (6 fish); 11. Breeders Egg-layers (6 fish); 12. Colibrator (Single). (Exhibits to be shown in square lots).

AT the end of February, a party of seventeen members of the Dewsbury and District A.S. made a journey of some sixty miles through a mixture of heavy snow showers and bright sunshine to visit the Trout Hatchery of the Yorkshire Ome River Board near Pickering. A very interesting afternoon was spent in a crowded tour of the Hatchery. Trout of all ages



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from 2-3 days to six-week olds were seen in their thousands. The eggs are hatch-retained from the female and the rest of the male is then mated through the eggs, which are hatched in running water at about 48°. The fry live on their yolk sacs for 5-6 weeks at this temperature and are then fed on finely minced liver for another 3 weeks before being put into one of the outdoor ponds. These ponds also are fed from the natural spring which provides the running water for the indoor fry-rearing concrete "tanks". The trout are fed with almost a specific diet of minced liver until they are two years old when all but a few are sold for stocking rivers, lakes, etc. The few best ones are retained for the stock pond from which future generations of trout will be produced.

Recently, Mr. A. Riss a society member, gave an interesting account of his experience in breeding three-spined sticklebacks, a variety of fish which, although caught locally, are so unobtainable in their breeding habitat and as bright in their colour as many of the exotic tropicals.

The first entries of the Haslemere and District A.S. will be to the London Zoo and a fish breeding establishment at Oxford.

A table show for Barbs and Labrynth class of the society, the results being as follows:

Barbs: Mr. Brett (Tiger Barb); 1, Master N. Wood (Scoliodon Barb); 2, Mr. Pratt (half-banded barb); 3, Mr. Spragg (dusky barb) and Mr. Willis (columbert barb) tie 3.

Labrynth: Master N. Wood (red light); 1, Mr. J. Mills (blue gurnard and parrot fish) 2 and 3.

AN effort is being made to revive the interest in the Lancaster, Morecambe and District A.S. The following officials were appointed at the recent meeting: President, Mr. H. Smith; Chairman, Mr. D. Wood; Secretary, Mr. J. H. Mearns; 15, Fincham Avenue, Lancaster; Treasurer, Mrs. J. Wood; Committee, Miss A. Rothery, Mr. D. Riddell, Mr. W. Shaw. The Society would welcome new members who are invited to contact the secretary.

The March meeting of the Leeds and District A.S. included a table show which consisted of two classes, one being for Barbs and the other for carp and minnows. The Barb result was 1 and 2, Mr. J. Smith; 3, Mrs. D. Hirst. The Carp and Minnows result was 1, Mr. J. Smith; 2, Mrs. D. Hirst. A talk was given by Mr. Reynolds on setting up an aquarium. Members are looking forward to the 29th April which is the date set for the first ever day open table show. Schedules can now be obtained from Mr. D. Lees, 39, Cowper Street, Leeds, 7. The Trinity Church Hall has been booked for the annual show which will be held from the 19th to the 22nd September.

RECENT activities of the Leth Aquarists' Club have included two talks.

One was on breeding Australian Rainbows by Mr. S. Campbell and the other on breeding, raising and fish diseases by Mr. C. Julian. The results of the Plant Show were: 1, A. Heyburn (*Hydrocotyle verticillata*); 2, T. Elliot (*Wendlandia*); 3, A. Hildray (*Ranunculus*). The winner of the Employers' competition was Mr. E. Venners with a Tiger Barb and Mr. P. Frate won the Liverbowers with a Black Severn. The Junior section was won by N. Venners with a Cherry Barb. The leading contributors for the "Aquarist of the Year" Shield are Mr. D. McNeil 21 points, Mr. J. Miles 21 points, Mr. T. Elliot 19 points, Mr. D. Hird 19 points. The secretary is Mr. Ian Kilgus, 25, Borewell Quayside, Edinburg, 7.

The Annual General Meeting of the North-Eastern Federation of Aquarist Societies was opened by the chairman Mr. F. W. Dunn who gave an interesting talk on the activities of the Federation since its inception in 1918. This was followed by a discussion on the future activities in 1962, various suggestions being put forward by the members. Mr. T. Pearson

tendered his resignation as secretary—a post he had held for the past 4 years. This was regrettably accepted. The election of officers for 1962 resulted as follows: Chairman, Mr. F. W. Dunn—re-elected; Hon. Secretary, Mr. R. Venners, 36 Douglas Terrace, Newcastle-upon-Tyne, 4.

The jar show results were as follows: Rainbow and Dussie: 1 and 2, Mr. Wrenn, T.A.B.S.; 3, Mr. Duffell, T.A.B.S.; Toothcarp: 1, Mr. Duffell, T.A.B.S.; 2, Mr. Duffell, T.A.B.S.; 3, Mr. Dunn, Newcastle, A.S.; 4, Mr. Dunn, Newcastle, A.S.; 5, Mr. Dunn, Newcastle, A.S.; 6, Mr. Dunn, Newcastle, A.S.; 7, Mr. Dunn, Newcastle, A.S.; 8, Mr. Dunn, Newcastle, A.S.; 9, Mr. Dunn, Newcastle, A.S.; 10, Mr. Dunn, Newcastle, A.S.

The next meeting will be held on 15th April in the Y.M.C.A., Sunderland.

AT the March meeting of the Aberborough and District A.S., Mr. W. Roberts (chairman) introduced to the meeting Mr. R. Winterton from Bradford. Mr. Winterton gave a very interesting and extensive talk on tropical plants and had with him a large variety of specimen plants to show members. The propagating and growing of these plants were explained and also their functions in the tank. The main table show was a chorizan class and the placings were: 1, Mr. Yeadon (Black Widow); 2, Mr. Pearce (Nona Terra); 3, Mr. Nicoll (Ocean Terra). In the A.D.V. class the placings were: 1, Mr. Hobson (Tiger Barb); 2, Mr. Scofield (Haddock); 3, Mr. Birch (Gerrardin). Mr. Winterton and Mr. J. Skinner judged the table show.

The Society has obtained permission from Yeadon County Council to set up a furnished aquaria in the Yeadon Town Hall Library for a short period and has been accepted into the A.Y.S. and the F.N.A.S. and looks forward to a long and happy association with each. New members or any keen aquarists are welcomed to the meeting which are held the first Thursday in each month at 7.45 p.m. at The Yeadon Brass Band Hall, Copper Hill, opposite Commercial Hotel, Harshaw Lane, Yeadon, or are invited to contact the Secretary Mr. B. W. Armstrong, 15, Charles Street, Hemforth, Leeds. Phone Haverforth 3462.

THE Newsletter from Bradford and District A.S. makes bright reading. The second of the English evenings was well attended and steady it is felt that the time and effort in organizing them have been worth the trouble. Recent speakers have been Mr. G. Taylor and Mr. Tudor and there have been the usual table shows which have been well reported. On the social side bookings are already being made for the first evening which is on Sunday the 29th April. The Open Table Show is to be held at Unity Hall, Keelson Square, Bradford on the 7th May.

AT the recent Annual General Meeting of the North Warwickshire A.S. the following officers were elected: Mr. S. Swadlow, Chairman; Mr. J. Inwood, Vice-Chairman; Mr. L. W. Hale, Hon. Secretary; Mrs. M. O'Brien, Hon. Treasurer; Messrs. J. H. Smith, Hans Van der Stuck, T. Lifford, D. Badger, Committee Members. The President of the Society is Mr. George Gifford.

THE Midway A.S. now meet on the second Wednesday in each month at Haslemere House, 32, New Road, Rochester. The Secretary is Mrs. F. Elliot, "Beechwood", Dagen Road, Chatham, Kent.

AT the monthly club assembly of the Guest Keen and Northfolks Pond and Aquarist Society, the main item of the evening was a tape recording of a talk on Climates of Fish by Mr. Laver, of a Hadon Aquarist Society. The recording was very excellent and at the end members discussed several points that had arisen during the recording. The end came with members divided over the points as to whether it was a good thing to try and cover the climate fish, or just throw it out of the tank.

PRIZEWINNERS in the recent competitions of the East of Fife A.S. were as follows: Toothcarp: 1 and 2, Mr. J. Stoddart, A.D.V.; 3, Mrs. M. Taggart; 4, Mr. J. Stoddart; 5, D. McDonald; Labrynth: 1, Mr. H. Campbell; 2, Mrs. M. Taggart; 3, Mr. J. Campbell. The monthly house meetings have now come to a close and will be resumed about September. Members who attended the Federation meeting in March had a lecture on Genetics given by Dr. A. H. Sanderson which proved to be very interesting.

SECRETARY CHANGES

CHANGES of secretaries and addresses have been reported from the following societies: Midway A.S. (Mrs. F. Elliot, "Beechwood", Dagen Road, Chatham, Kent); North-Eastern Federation of Aquarist Societies (Mr. H. Wrenn, 36 Douglas Terrace, Newcastle-upon-Tyne, 4); Rochdale A.S. (Mr. W. Beadney, 62, Wallbank Drive, Whitworth, Rochdale); Warwick Aquarist and Zoological Society (Mr. T. W. G. Mitchell, 3, Southview Cottage, Cheslade, Walsley, North.).



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